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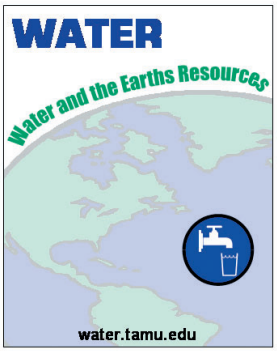

Drinking Water Standards

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When you turn on your faucet and fill a glass with water, you expect it to be safe and pure. However, drinking water can contain gases, minerals, bacteria, metals or chemicals that can affect your health and the quality of your water.

Some of these contaminants occur naturally, such as minerals found in water because of erosion; others may be caused by human activity, such as from the use of pesticides and fertilizers on home lawns or crop fields.

The federal government has set limits on the amounts of certain contaminants that can be present in public water supplies. These limits, or standards, were established to protect your health and to ensure that your water is of good quality. The standards were set by the 1974 Safe Drinking Water Act and its amendments. In addition to the standards set by the federal government, the states can establish stricter limits for specific drinking water contaminants.

If your water is supplied by a public water supply system, it is routinely tested for about 90 contaminants. You can get the results of those tests from your water supplier. Every year, public water suppliers are required to send copies of a report on water quality, called a consumer confidence report, to all of their customers. The report must list all the regulated contaminants, specify the concentration of each in your drinking water and name the source of that water.

When checking your water supplier's consumer confidence report and evaluating the quality of the water you drink, it helps to know the legal requirements for water quality, the process used to set those requirements, and the possible health effects of drinking water that does not meet those standards.

Drinking Water Standards

The U.S. Environmental Protection Agency (EPA) has set two categories of standards for drinking water—**primary standards** and **secondary standards**.

Primary Drinking Water Standards

Primary standards are set for contaminants that when consumed can harm human health. These standards are enforced by the EPA. They protect you from three classes of harmful pollutants:

- **pathogens**, which are disease-causing organisms such as bacteria, fungi or viruses.
- **radioactive elements**, which are substances that emit radiation, such as radium, uranium and plutonium. Radiation can cause cancer in people and other living things.
- **toxic chemicals**, which are substances that can injure or kill people.

Primary standards set a limit on the amount of each contaminant that can be present in the drinking water supplied by a public water system. This limit is called the **maximum contaminant level (MCL)**, and it is usually measured in milligrams per liter (mg/L). The current primary standards for drinking water are listed in Table 1.

Secondary Drinking Water Standards

Secondary standards regulate contaminants that are a nuisance but do not harm your health. These standards regulate contaminants that cause offensive taste, odor, color, corrosion, foaming or staining. The standard is called the **secondary maximum contaminant level (SMCL)**.

Although secondary standards are not enforced, they provide guidelines for governmental and other entities wanting to provide communities with the best quality water possible. Table 2 lists the current secondary standards for drinking water.

How Standards are Set

When developing primary standards for drinking water contaminants, the EPA uses three criteria:

- whether the contaminant harms your health,
- whether it is detectable in drinking water, and
- whether it is known to occur in drinking water.

In setting primary standards for a drinking water contaminant, the government first looks at the research conducted on that contaminant. Most of that research has been done on animals, but some studies have been done on humans or on disease outbreaks in humans. Experts use this information to estimate the amount of a contaminant that may be harmful in drinking water.

The levels of contaminants found in drinking water are seldom high enough to cause health effects that are *acute*—that is, those that occur within hours or days of ingesting a contaminant. Thus, health officials are most concerned about *chronic* health effects, which are those that occur when a contaminant is consumed at levels above the MCL over an extended period. Examples of chronic health effects include cancer, miscarriages, birth defects, organ damage and nervous system disorders.

In addition, when setting the standards for drinking water, regulators treat cancer-causing substances (carcinogens) differently from contaminants that cause other health effects.

Noncancerous Chemicals

For chemicals that cause adverse health effects other than cancer, officials determine the daily amount of a substance that a person can safely ingest over a lifetime. This amount is called the **acceptable daily intake (ADI)**. Scientists consider this level to be not harmful to your health. The level includes a conservative margin of safety.

Regulators use the acceptable daily intake to establish a goal for the amount a person can drink safely over a lifetime. This lifetime amount is called the **maximum contaminant level goal (MCLG)**. This goal is based entirely on health considerations and is set at a level so as to cause no harm to a person's health.

Although the lifetime goal level is not enforced by the EPA, regulators use it to set drinking water standards that are enforceable.

Once the lifetime goal for a contaminant is established, the EPA sets a **maximum contaminant level (MCL)** for that substance in drinking water. The MCL is the primary standard enforced by the EPA.

The MCL is set as close as possible to the lifetime goal level. However, when setting the MCL standard, regulators consider, in addition to health effects, the feasibility and the combined costs of analyzing water for a contaminant and for treating water to remove the contaminant. Therefore, the MCL (the maximum allowable level in a sample of water) is often less stringent than the MCLG (the maximum level of consumption over a person's lifetime).

Cancer-Causing Chemicals

When setting primary standards for chemicals that are believed to cause cancer, regulators assume that no concentration is safe. Therefore, the lifetime goal—the MCLG—is set at zero. However, because a zero level is not always possible to achieve, regulators estimate toxicity by calculating a figure called a risk estimate.

In theory, any concentration of a carcinogen in your drinking water may cause cancer. However, at very low concentrations, the risk of cancer becomes so small that it is considered negligible. Regulators must decide what level of risk is acceptable. It may be one excess cancer in 10,000 persons or one excess cancer in 1 million persons exposed over a lifetime (70 years). The concentration of a contaminant estimated to cause this "acceptable level" of risk is the risk estimate.

Drinking Water Standards Are Not Absolute

Current drinking water standards do not guarantee that the glass of water you draw from your tap will be absolutely safe and pure. There are no guarantees that it is totally risk-free, for several reasons:

- The process used to set drinking water standards is imperfect and rarely based on conclusive studies conducted on humans.
- Very little research is available on the health effects of drinking small amounts of chemicals over long periods.
- Regulatory decisions are often complicated by economic, political and social considerations.
- The standards also consider the possible presence of other chemicals, which may increase or decrease the toxicity of the contaminant.

The standards do reflect sound scientific judgment and are based on the best and most current knowledge available. They also include margins of safety to reduce adverse health effects and protect human health.

Current Drinking Water Standards

The EPA has set maximum levels for more than 90 contaminants, including:

- pesticides, such as atrazine and alachlor,
- trihalomethanes, which are chemical compounds that can be formed during the chlorination of drinking water,
- organic chemicals, which are compounds derived from living organisms (animals or plants), such as benzene and polychlorinated biphenyls,
- inorganic contaminants, which are substances not derived from living organisms, such as arsenic and lead,
- microbial contaminants, which are microorganisms such as bacteria and viruses, and
- radionuclides, which are substances that are radioactive.

The EPA also reviews other contaminants that are present in drinking water but are not currently regulated by either state or federal standards. The contaminants are placed on the EPA's "contaminant candidate list," and research is conducted on them to determine whether they need to be regulated or whether more research is needed to make a sound, scientific decision.

The status of all the currently regulated contaminants is reviewed by the EPA every 6 years.

State Responsibilities

The responsibility for enforcing the EPA's drinking water standards falls to regulatory officials at the state level. A state may set its own standards in addition to the federal EPA standards, but they cannot be less stringent than the EPA's. In Texas, the state agency that regulates drinking water standards is the Texas Commission on Environmental Quality (TCEQ).

Ultimately, public water suppliers are responsible for the quality of water they deliver to their customers. These water suppliers maintain water distribution systems, routinely test and treat the water and provide reports of water quality to the TCEQ. Through this testing and treatment process, public water suppliers work to provide safe and high quality water to the customers they serve.

When the Water is Contaminated

At times, a water supply system may violate the drinking water standard for a contaminant or series of contaminants. When such a violation occurs, the public water supply system must notify its customers, telling them:

- what the violation is,
- what the violation actually means to a person using the water, and
- how the system is responding or will respond to correct the violation.

If consuming water from the system would harm human health, the water supply system must use television, radio and newspapers to inform the public as quickly as possible. The announcement may include advice on how customers may treat the water, such as boiling, to make it safe to use.

The water supplier also may choose to distribute more in-depth information to its customers through the mail or as part of its water billing process.

Remember to review the annual quality report on your water. This annual report is referred to as the consumer confidence report or CCR. Contact

your water supplier if you have not received a copy of the CCR for your water supply system.

If you use a private water well, neither the federal nor state government regulates the quality of your water. As a minimum precaution, it is recommended that you test your well water every 2 to 3 years for bacteria and nitrate. You should also have your water tested if a pesticide or fertilizer spill occurs near your well or if the taste, smell, clarity or color of the water changes.

For information on private well water testing, contact your local office of Texas Cooperative Extension or the Texas Department of State Health Services.

Whether you receive your water from a public water supply or from a private source, there are at-home treatment techniques you can use to improve the quality of your water. For a list of treatment alternatives for various water quality concerns, see Extension publication L-5450, *Solving Water Quality Problems in the Home*.

Texas Cooperative Extension also has developed a series of publications on individual contaminants such as nitrate, lead and bacteria. This series is entitled *Drinking Water Problems* and is available from the Extension Bookstore Web site at http://tcebookstore.org.

More information on individual water quality contaminants is available from Extension publications SCS-2002-10, *Description of Water Analysis Parameters*, and E-176, *What's In My Water?* These and other water-related publications may be viewed on or ordered from the TCE Bookstore Web site or the Web site of the Texas A&M Soil and Crop Sciences Department at http://soilcrop.tamu.edu.

Table 1. Primary Standards for Drinking Water in the United States.

Legend: D = disinfectant; DBP = disinfection byproduct; IOC = inorganic chemical; M = microorganism; R = radionuclides; OC = organic chemical; MFL = milllion fibers per liter

	Contaminant	Maximum level[1] or treatment technique[1] (mg/L)[2]	Potential health effects from exposure above the MCL	Common sources of contaminant in drinking water	Public health goal
OC	Acrylamide	TT[3]	Nervous system or blood problems	Added to water during sewage/wastewater increased risk of cancer treatment	zero
OC	Alachlor	0.002	Eye, liver, kidney or spleen problems; anemia; increased risk of cancer	Runoff from herbicide used on row crops	zero
R	Alpha particles	15 picocuries per liter (pCi/L)	Increased risk of cancer	Erosion of natural deposits of certain minerals that are radioactive and may emit a form of radiation known as alpha radiation	zero
IOC	Antimony	0.006	Increase in blood cholesterol; decrease in blood sugar	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder	0.006
IOC	Arsenic	0.010 as of 1/23/06	Skin damage or problems with circulatory systems; may increase risk of getting cancer	Erosion of natural deposits; runoff from orchards, runoff from glass and electronics production wastes	0
IOC	Asbestos (fibers >10 micrometers)	7 MFL	Increased risk of developing benign intestinal polyps	Decay of asbestos cement in water mains; erosion of natural deposits	7 MFL
OC	Atrazine	0.003	Cardiovascular system or reproductive problems	Runoff from herbicide used on row crops	0.003
IOC	Barium	2	Increase in blood pressure	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits	2
OC	Benzene	0.005	Anemia; decrease in blood platelets; increased risk of cancer	Discharge from factories; leaching from gas storage tanks and landfills	zero

	Contaminant	Maximum level[1] or treatment technique[1] (mg/L)[2]	Potential health effects from exposure above the MCL	Common sources of contaminant in drinking water	Public health goal
OC	Benzo(a)pyrene (PAHs)	0.0002	Reproductive difficulties; increased risk of cancer	Leaching from linings of water storage tanks and distribution lines	zero
IOC	Beryllium	0.004	Intestinal lesions	Discharge from metal refineries and coal-burning factories; discharge from electrical, aerospace and defense industries	0.004
R	Beta particles and photon emitters	4 millirems per year	Increased risk of cancer	Decay of natural and man-made deposits of certain minerals that are radioactive and may emit forms of radiation known as photons and beta radiation	zero
DBP	Bromate	0.010	Increased risk of cancer	Byproduct of drinking water disinfection	zero
IOC	Cadmium	0.005	Kidney damage	Corrosion of galvanized pipes; erosion of natural deposits; discharge from metal refineries; runoff from waste batteries and paints	0.005
OC	Carbofuran	0.04	Problems with blood, nervous system or reproductive system	Leaching of soil fumigant used on rice and alfalfa	0.04
OC	Carbon tetrachloride	0.005	Liver problems; increased risk of cancer	Discharge from chemical plants and other industrial activities	zero
D	Chloramines (as(Cl_2)	MRDL=4.0[1]	Eye/nose irritation; stomach discomfort, anemia	Water additive used to control microbes	MRDGL=4[1]
OC	Chlordane	0.002	Liver or nervous system problems; increased risk of cancer	Residue of banned termiticide	zero
D	Chlorine (as Cl_2)	MRDL=4.0[1]	Eye/nose irritation; stomach discomfort	Water additive used to control microbes	MRDGL=4[1]
D	Chlorine dioxide (as ClO_2)	MRDL=0.8[1]	Anemia; infants and young children: nervous system effects	Water additive used to control microbes	MRDGL=0.8[1]
DBP	Chlorite	1.0	Anemia; infants and young children: nervous system effects	Byproduct of drinking water disinfection	0.8
OC	Chlorobenzene	0.1	Liver or kidney problems	Discharge from chemical and agricultural chemical factories	0.1
IOC	Chromium (total)	0.1	Allergic dermatitis	Discharge from steel and pulp mills; erosion of natural deposit	0.1
IOC	Copper	TT[7]; Action Level = 1.3	Short-term exposure: gastrointestinal distress. Long-term exposure: liver or kidney damage. People with Wilson's disease should consult their doctors if the amount of copper in their water exceeds the action level.	Corrosion of household plumbing systems; erosion of natural deposits	1.3
M	*Cryptosporidium*	TT[3]	Gastrointestinal illness (diarrhea, vomiting, cramps)	Human and animal fecal waste	zero
IOC	Cyanide (as free cyanide)	0.2	Nerve damage or thyroid problems	Discharge from steel/metal factories; discharge from plastic and fertilizer factories	0.2
OC	2,4-D	0.07	Kidney, liver or adrenal gland problems	Runoff from herbicide used on row crops	0.07
OC	Dalapon	0.2	Minor kidney changes	Runoff from herbicide used on rights of ways	0.2
OC	1,2-Dibromo-3-chloropropane (DBCP)	0.0002	Reproductive difficulties; increased risk of cancer	Runoff/leaching from soil fumigant used on soybeans, cotton, pineapples, and orchards	zero

	Contaminant	Maximum level[1] or treatment technique[1] (mg/L)[2]	Potential health effects from exposure above the MCL	Common sources of contaminant in drinking water	Public health goal
OC	o-Dichlorobenzene	0.6	Liver, kidney or circulatory system problems	Discharge from industrial chemical factories	0.6
OC	p-Dichlorobenzene	0.075	Anemia; liver, kidney or spleen damage; changes in blood	Discharge from industrial chemical factories	0.075
OC	1,2-Dichloroethane	0.005	Increased risk of cancer	Discharge from industrial chemical factories	zero
OC	1,1-Dichloroethylene	0.007	Liver problems	Discharge from industrial chemical factories	0.007
OC	cis-1,2-Dichloroethylene	0.07	Liver problems	Discharge from industrial chemical factories	0.07
OC	trans-1,2-Dichloroethylene	0.1	Liver problems	Discharge from industrial chemical factories	0.1
OC	Dichloromethane	0.005	Liver problems; increased risk of cancer	Discharge from drug and chemical factories	zero
OC	1,2-Dichloropropane	0.005	Increased risk of cancer	Discharge from industrial chemical factories	zero
OC	Di(2-ethylhexyl) adipate	0.4	Weight loss, liver problems or possible reproductive difficulties	Discharge from chemical factories	0.4
OC	Di(2-ethylhexyl) phthalate	0.006	Reproductive difficulties; liver problems; increased risk of cancer	Discharge from rubber and chemical factories	zero
OC	Dinoseb	0.007	Reproductive difficulties	Runoff from herbicide used on soybeans and vegetables	0.007
OC	Dioxin (2,3,7,8-TCDD)	0.00000003	Reproductive difficulties; increased risk of cancer	Emissions from waste incineration and other combustion; discharge from chemical factories	zero
OC	Diquat	0.02	Cataracts	Runoff from herbicide use	0.02
OC	Endothall	0.1	Stomach and intestinal problems	Runoff from herbicide use	0.1
OC	Endrin	0.002	Liver problems	Residue of banned insecticide	0.002
OC	Epichlorohydrin	TT[8]	Increased cancer risk and, over a long period, stomach problems	Discharge from industrial chemical factories; an impurity of some water treatment chemicals	zero
OC	Ethylbenzene	0.7	Liver or kidney problems	Discharge from petroleum refineries	zero
OC	Ethylene dibromide	0.00005	Problems with liver, stomach, reproductive system or kidneys; increased risk of cancer	Discharge from petroleum refineries	zero
IOC	Fluoride	4.0	Bone disease (pain and tenderness of the bones); children may get mottled teeth from fertilizer and aluminum factories	Water additive that promotes strong teeth; erosion of natural deposits; discharge	4.0
M	*Giardia lamblia*	TT[3]	Gastrointestinal illness (such as diarrhea, vomiting, cramps)	Human and animal fecal waste	zero
OC	Glyphosate	0.7	Kidney problems; reproductive difficulties	Runoff from herbicide use	0.7
DBP	Haloacetic acids (HAA5)	0.060	Increased risk of cancer	Byproduct of drinking water disinfection	n/a[6]
OC	Heptachlor	0.0004	Liver damage; increased risk of cancer	Residue of banned termiticide	zero
OC	Heptachlor epoxide	0.0002	Liver damage; increased risk of cancer	Breakdown of heptachlor	zero

	Contaminant	Maximum level[1] or treatment technique[1] (mg/L)[2]	Potential health effects from exposure above the MCL	Common sources of contaminant in drinking water	Public health goal
M	Heterotrophic plate count (HPC)	TT[3]	HPC has no health effects; it is an analytic method used to measure the variety of bacteria that are common in water. The lower the concentration of bacteria in drinking water, the better maintained the water system is.	HPC measures a range of bacteria that are naturally present in the environment.	n/a
OC	Hexachlorobenzene	0.001	Liver or kidney problems; reproductive difficulties; increased risk of cancer	Discharge from metal refineries and agricultural chemical factories	zero
OC	Hexachlorocyclo-pentadiene	0.05	Kidney or stomach problems	Discharge from chemical factories	0.05
IOC	Lead	TT[7]; Action Level = 0.015	Infants and children: delays in physical or mental development; children could show slight deficits in attention span and learning abilities. Adults: kidney problems; high blood pressure	Corrosion of household plumbing systems; erosion of natural deposits	zero
M	*Legionella*	TT[3]	Legionnaire's disease, a type of pneumonia	Found naturally in water; multiplies in heating systems	zero
OC	Lindane	0.0002	Liver of kidney problems	Runoff/leaching from insecticide used on cattle, lumber, gardens	0.0002
IOC	Mercury (inorganic)	0.002	Kidney damage	Erosion of natural deposits; discharge from refineries and factories; runoff from landfills and croplands	0.002
OC	Methoxychlor	0.04	Reproductive difficulties	Runoff/leaching from insecticide used on fruits, vegetables, alfalfa, livestock	0.04
IOC	Nitrate (measured as nitrogen)	10	Infants under 6 months old who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits	10
IOC	Nitrite (measured as nitrogen)	1	Infants under 6 months old who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits	1
OC	Oxamyl (Vydate)	0.2	Slight nervous system effects	Runoff/leaching from insecticide used on apples, potatoes and tomatoes	0.2
OC	Pentachlorophenol	0.001	Liver or kidney problems; increased cancer risk	Discharge from wood-preserving factories	zero
OC	Picloram	0.5	Liver problems	Herbicide runoff	0.5
OC	Polychlorinated biphenyls (PCBs)	0.0005	Skin changes; thymus gland problems; immune deficiencies; reproductive or nervous system difficulties; increased risk of cancer	Runoff from landfills; discharge of waste chemicals	zero
R	Radium 226 and Radium 228 (combined)	5 pCi/L	Increased risk of cancer	Erosion of natural deposits	zero

	Contaminant	Maximum level[1] or treatment technique[1] (mg/L)[2]	Potential health effects from exposure above the MCL	Common sources of contaminant in drinking water	Public health goal
IOC	Selenium	0.05	Hair or fingernail loss; numbness in fingers or toes; circulatory problems	Discharge from petroleum refineries; erosion of natural deposits; discharge from mines	0.05
OC	Simazine	0.004	Problems with blood	Herbicide runoff	0.004
OC	Styrene	0.1	Liver, kidney or circulatory system problems	Discharge from rubber and plastic factories; leaching from landfills	0.1
OC	Tetrachloroethylene	0.005	Liver problems; increased risk of cancer	Discharge from factories and dry-cleaners	zero
IOC	Thalium	0.002	Hair loss; changes in blood; kidney, intestine or liver problems	Leaching from ore-processing sites; discharge from electronics, glass and drug factories	0.0005
OC	Toulene	1	Nervous system, kidney or liver problems	Discharge from petroleum factories	1
M	Total Coliforms (including fecal coliform and E. Coli)	5.0%[4]	Not a health threat in itself; it is used to indicate whether other potentially harmful bacteria may be present[5]	Coliforms are naturally present in the environment as well as in feces; fecal coliforms and E. coli come only from human and animal fecal waste	zero
DBP	Total Trihalomethanes (TTHMs)	0.10 0.080 after 12/31/03	Liver, kidney or central nervous system problems; increased risk of cancer	Byproduct of drinking water disinfection	n/a[6]
OC	Toxaphene	0.003	Kidney, liver or thyroid problems; increased risk of cancer	Runoff/leaching from insecticide used on cotton and cattle	zero
OC	2,4,5-TP (Silvex)	0.05	Liver problems	Residue of banned herbicide	0.05
OC	1,2,4-Trichlorobenzene	0.07	Changes in adrenal glands	Discharge from textile finishing factories	0.07
OC	1,1,1-Trichloroethane	0.2	Liver, nervous system or circulatory problems	Discharge from metal degreasing sites and other factories	0.20
OC	1,1,2-Trichloroethane	0.005	Liver, kidney or immune system problems	Discharge from industrial chemical factories	0.003
OC	Trichloroethylene	0.005	Liver problems; increased risk of cancer	Discharge from metal degreasing sites and other factories	zero
M	Turbidity	TT[3]	Turbidity is a measure of the cloudiness of water. It is used to indicate water quality and filtration effectiveness (such as whether disease-causing organisms are present). Higher turbidity levels are often associated with higher levels of disease-causing micro-organisms such as viruses, parasites and some bacteria. These organisms can cause symptoms such as nausea, cramps, diarrhea and associated headaches.	Soil runoff	n/a
R	Uranium	30 ug/L as of 12/08/03	Increased risk of cancer, kidney toxicity	Erosion of natural deposits	zero
OC	Vinyl chloride	0.002	Increased risk of cancer	Leaching from PVC pipes; discharge from plastic factories	zero

	Contaminant	Maximum level[1] or treatment technique[1] (mg/L)[2]	Potential health effects from exposure above the MCL	Common sources of contaminant in drinking water	Public health goal
M	Viruses (enteric)	TT[3]	Gastrointestinal illness (such as diarrhea, vomiting, cramps)	Human and fecal waste	zero
OC	Xylenes (total)	10	Nervous system damage	Discharge from petroleum factories; discharge from chemical factories	10

NOTES

[1] Definitions

- Maximum Contaminant Level Goal (MCLG) - the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety and are nonenforceable public health goals.
- Maximum Contaminant Level (MCL) - The highest level of a contaminant allowed in drinking water. MCLs are set as close to MCLGs as feasible using the best available treatment technology and taking cost into consideration. MCLs are enforceable standards.
- Maximum Residual Disinfectant Level Goal (MRDLG) - The level of a drinking water disinfectant below which there is no known or expected health risk. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
- Maximum Residual Disinfectant Level (MRDL) - The highest level of a disinfectant allowed in drinking water. There is convincing evidence that it is necessary to add a disinfectant to control microbial contaminants.
- Treatment Technique (TT) - A required process intended to reduce the level of a contaminant in drinking water.

[2] Units are in milligams per liter (mg/L) unless otherwise noted. Milligrams per liter are equivalent to parts per million (ppm).

[3] EPA's surface water treatment rules require systems using surface water or ground water under the direct influence of surface water to (1) disinfect their water and (2) filter their water or meet criteria for avoiding filtration so that the following contaminants are controlled at the following levels:

- *Cryptosporidium* (as of January 1, 2002, for systems serving >10,000 and January 14, 2005, for systems serving < 10,000) 99% removal.
- *Giardia lambia:* 99.9% removal/inactivation.
- Viruses: 99.9% removal/inactivation.
- *Legionella:* No limit, but EPA believes that if *Giardia* and viruses are removed/inactivated. *Legionella* will also be controlled.
- Turbidity: At no time can turbidity (cloudiness of water) go above 5 nephelometric turbidity units (NTU); systems that filter must ensure that the turbidity go no higher than 1 NTU (0.5 NTU for conventional or direct filtration) in at least 95% of the daily samples in any month. As of January 1, 2002, for systems servicing >10,000 and January 14, 2005, for systems servicing <10,000 turbidity may never exceed 1 NTU, and must not exceed 0.3 NTU in 95% of daily samples in any month.
- HPC: no more than 500 bacterial colonies per milliliter.
- Long Term 1 Enhanced Surface Water Treatment (Effective date: January 14, 2005); Surface water systems or (GWUDI) systems serving fewer than 10,000 people must comply with the applicable Long Term 1 Enhanced Surface Water Treatment Rule provisions (such as turbidity standards, individual filter monitoring, *Cryptosporidium* removal requirements, updated watershed control requirements for unfiltered systems).
- Filter Backwash Recycling: The Filter Backwash Recycling Rule requires systems that recycle to return specific recycle flows through all processes of the system's existing conventional or direct filtration system or at an alternate location approved by the state.

[4] No more than 5.0% samples total coliform-positive in a month. (For water systems that collect fewer than 40 routine samples per month, no more than one sample can be total coliform-positive per month.) Every sample that has total coliform must be analyzed for either fecal coliforms or *E. coli*. If two consecutive TC-positive samples, and one is also positive for *E. coli* coliforms, systems has an acute MCL violation.

[5] Fecal coliform and *E. coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Disease-causing microbes (pathogens) is these wastes can cause diarrhea, cramps, nausea, headaches, or other symptoms. These pathogens may pose a special health risk for infants, young children, and people with severely compromised immune systems.

[6] Although there is no collective MCLG for this contaminant group, there are individual MCLGs for some of the individual contaminants.

- Halaocetic acids: dichloroacetic acid (zero), trichloroacetic acid (0.3 mg/L)
- Trihalomethanes: bromodichloromethane (zero); dibromochloromethane (0.06 mg/L).

[7] Lead and copper are regulated by a Treatment Technique that requires systems to control the corrosiveness of their water. If more than 10% of tap water samples exceed the action level, water systems must take additional steps. For copper, the action level is 1.3 mg/L, and for lead is 0.015 mg/L.

[8] Each water system must certify, in writing, to the state (using third-party or manufacturers certification), that when it uses acrylamide and/or epichlorohydrin to treat water, the combination (or product) of dose and monomer level does not exceed the levels specified, as follows: Acrylamide=0.05% dosed at 1 mg/L (or equivalent); Epichlorohydrin=0.01% dosed at 20 mg/L (or equivalent).

Source: Environmental Protection Agency

Table 2. Secondary Standards for Drinking Water in the United States.

National secondary Drinking Water Standards are nonenforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor or color) in drinking water. The EPA recommends secondary standards to water systems but does not require systems to comply. However, states may choose to adopt them as enforceable standards.

Contaminant	Secondary Standard
Aluminum	0.05 to0.2 mg/L
Chloride	250 mg/L
Color	15 (color units)
Copper	1.0 mg/L
Corrosivity	noncorrosive
Fluoride	2.0 mg/L
Foaming Agents	0.5 mg/L
Iron	0.3 g/L
Manganese	0.05 mg/L
Odor	3 threshold odor number
pH	6.5-8.5
Silver	0.10 mg/L
Sulfate	250 mg/L
Total Dissolved Salts	500 mg/L
Zinc	5 mg/L

Source: Environmental Protection Agency, Office of Water, June 2003

For more information

EPA Drinking Water and Health What You Need to Know, EPA 816-K-99-001, October 1999, United States Environmental Protection Agency, Office of Water, Washington, D.C.

Water On Tap: A Consumer's Guide to the Nation's Drinking Water, EPA-815-K-97-002, July 1997, United States Environmental Protection Agency, Office of Water, Washington, D.C.

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